Remarks

Reconsideration and reversal of the rejections expressed in the Office Action of June 28, 2006 are respectfully contended in view of the following remarks and the application as amended. The present invention relates to a Cu damascene structure, which is formed by treating the top surface of the surrounding low-k interlayer dielectric with a nitrogen or carbon containing medium, to form a silicon nitride or silicon carbide diffusion barrier, rather than capping the top surface of the Cu with a metal diffusion barrier, as is conventionally done.

Claims 1, 17 and 22-23 were rejected under 35 U.S.C. §103(a) as being unpatentable over DeFelipe et al., U.S. Patent No. 6,541,374 in view of Sudijono et al., U.S. 2004/0092098. In response to the Examiner's remarks at pages 5-6 of the Office Action, the claims have been clarified to overcome this rejection. Support for such clarifications is found at e.g., paragraphs 17-18 of the present specification.

Claims 20-21 and 24-27 were rejected under 35 U.S.C. §103(a) as being unpatentable over DeFelipe et al. '374 in view of Sudijono et al., and further in view of Okada et al., U.S. Patent No. 6,583,046; claims 28-30 were rejected under 35 U.S.C. §103(a) as being unpatentable over DeFelipe et al. in view of Sudijono et al. and further in view of Okada et al.. The Office Action states, inter alia, that it would have been obvious to modify De Felipe and Sudijono by using HSQ as the low-k dielectric in view of Okada.

The '374 patent relates to methods for forming diffusion barrier layers in the context of integrated circuit fabrication. Methods of the invention allow selective deposition of a metal-nitride barrier layer material on a partially fabricated integrated circuit having exposed conductor and dielectric regions, and conversion of the metal-nitride barrier material into an effective diffusion barrier layer having low via resistance. In a preferred method using TiN, differential morphology in a single barrier layer deposition is achieved by controlling CVD process conditions. Sudijono et al. relates to an improved method of controlling a critical dimension during a photoresist patterning process which can be applied to forming vias and trenches in a dual damascene structure. The Examiner makes reference to paragraph [0024] of the reference; there it is noted that the barrier layer of silicon carbide (SiC) has a thickness of between about 200-1000 angstroms.

Okada et al. relates to deleterious poisoning of patterned photoresist masking layers accompanying plasma ashing/etching of photoresist and/or low-k dielectric layers in a nitrogen-containing atmosphere, which is eliminated, or at least substantially reduced, by post-treating exposed surfaces of the low-k dielectric layer(s) with hydrogen, e.g. by contact with H_2 gas at an elevated temperature or with a H_2 plasma subsequent to plasma ashing/etching. This rejection is likewise overcome based on the claims as amended.

For all of the above reasons, it is respectfully contended that the solicited claims define patentable subject matter. Reconsideration and reversal of the rejections expressed in the Office Action of June 28, 2006 are respectfully submitted. The Examiner is invited to call the undersigned if any questions arise during the course of reconsideration of this matter.

Respectfully submitted,

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